Fast, Power-Efficient Pulse Modulator For Optical Crosslinks

Completed Technology Project (2016 - 2018)

Project Introduction

This project will advance optical communications interlinking between small spacecraft using pulse position modulation. The Miniature Optical Communications Transceiver (MOCT) consists of a novel software-defined pulse modulator, integrated laser system, and avalanche photodetection system. At the end of the project, MOCT will be tested for a future CubeSat flight demonstration mission.

Anticipated Benefits

Because the pulse timing is generated using programmable delays within a field-programmable gate array, it does not require a power hungry gigahertz slot clock or processor. Instead, a low power 10 megahertz chip-scale atomic clock is used to continuously calibrate the timing delay chain. The timing resolution of this system is roughly a factor of four better than previously flown systems, meaning that it can transmit more bits of data with each optical pulse. Because this technology can both generate and time-stamp the arrival of short optical pulses with 50 ps precision, it simultaneously provides power efficient communications and relative ranging between small spacecraft at the cm-level.

Primary U.S. Work Locations and Key Partners

Fast, Power-Efficient Pulse Modulator For Optical Crosslinks

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of Florida

Responsible Program:

Small Spacecraft Technology

Small Spacecraft Technology

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Organizations Performing Work	Role	Type	Location
University of Florida	Lead Organization	Academia	Gainesville, Florida
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Florida

Project Transitions

August 2016: Project Start

August 2018: Closed out

Closeout Summary: Elements of MOCT will fly on CLICK and later Starling missions

Project Website:

https://www.nasa.gov/directorates/spacetech/small_spacecraft/index.html#.V(

Project Management

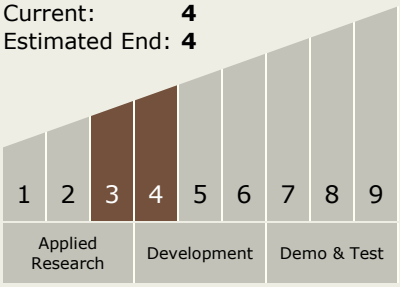
Program Director:
Christopher E Baker

Program Manager:
Roger Hunter

Principal Investigator:
John W Conklin

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Target Destinations

Earth, The Moon